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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/462,796	01/13/2000	TAKAYOSHI WATANABE	500.38090X00	5528

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EXAMINER

NGUYEN, THANH T

ART UNIT PAPER NUMBER

2813

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/462,796

Applicant(s)

WATANABE ET AL.

Examiner

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 34-53 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 34-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. (U.S. Patent No. 6,271,110) or Akram et al. (U.S. Patent No. 5,592,736) or Takahiro et al. (JP patent No. 08191072) in view of Akira (JP Patent No. 05-121409), Ochiai et al. (U.S. Patent No. 5,643,831) and Michihiko et al. (JP Patent No. 05206221).

Referring to figures, teaches a method of producing a semiconductor device comprising the steps of:

Forming a plurality of pyramidal bump electrodes (16/34) or the semiconductor device,
and

Connecting the pyramidal bump electrodes to pad electrodes (32) of the semiconductor device,

The step of forming the plurality of pyramidal bump electrodes including: a step of forming etched holes (see col. 5, lines 60-64) by anisotropically etching base material having a crystal orientation (see col. 8, lines 37-42), and

A step of filling up the etched holes by plating a metal (see col. 9, lines 17-20).

However, the reference does not teach etching a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes, forming a primary film of the same material as the metal for plating of the metal on the base material, and filling the metal such as gold/nickel, copper.

Akira teaches filling the opening with a copper or gold (20/26, see paragraph 21) by electroless plating.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would fill the opening with a copper or gold by electroless plating in process of Yamaguchi et al. as taught by Akira because the process would provide excellent selectivity and adhesive strength on the film.

Ochiai et al. teaches a method of etching a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes (see figures 8A-8H and related text).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would etch a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes in

process of Yamaguchi et al. or Akram et al. as taught by Ochiai et al. because the process would bring the plate into a chemically stable condition and provides a low wetability to the plate, so a durability of the plate is improve and formed solder balls can be easily transferred.

Michihiko teaches forming a primary film of the same material as the metal for plating of the metal on the base material (see page 3, paragraph#7).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a primary film of the same material as the metal for plating of the metal on the base material in process or Yamaguchi et al. or Akram et al. or Takahiro et al. as taught by Michihiko because the process would prevent generation of short-circuit.

It is known in the art to form the filling metal such as gold/nickel, copper.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form the filling metal such as gold/nickel, copper in process of Yamaguchi et al. or Akram et al. because process in known in the art since determining the optimum material for the layer only involved routine skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (703) 308-9439, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:30AM to 4:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (703) 308-4940. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).



Thanh Nguyen
Patent Examiner
Patent Examining Group 2800

TTN